CHILDREN'S UNDERSTANDING OF FALSE BELIEFS: A COMPARISON OF THE AFFECTIVE AND PHYSICAL DOMAINS

BY

TERESA L. DAVIS

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1992

TABLE OF CONTENTS

Page

ABSTRACT.....ii

CHAPTERS

1 INTRODUCTION.....1

Children's Understanding of False Beliefs.....3
Comparison of the Affective and Physical Domains.....26

2 METHOD.....33

Sample and Materials.....33
Procedure.....34
Scoring.....37

3 RESULTS.....38

Comparison of Domains and Methods of Presentation.....38
The Influence of Task-Related Differences on Performance.....45

4 DISCUSSION.....52

Domain Comparisons.....52
Methods of Presentation Comparisons.....61
Representational Change and Other False Belief.....64
Theoretical Implications.....65
Future Research.....67

REFERENCES.....71

APPENDIX.....76

BIOGRAPHICAL SKETCH.....78

Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

CHILDREN'S UNDERSTANDING OF FALSE BELIEFS:
A COMPARISON OF THE AFFECTIVE AND PHYSICAL DOMAINS

By

Teresa L. Davis

August 1992

Chairman: Patricia H. Miller
Major Department: Psychology

The current study examined one aspect of children's understanding of mental representations, that a belief can be false. The study had two purposes. The first was to compare children's understanding of false beliefs in the affective and physical domains using an unexpected contents task in a within-subjects design. Two types of false belief understanding were investigated: representational change (the knowledge that your own belief has changed) and the understanding that another's belief may be false. The second purpose was to study the facilitation of false belief knowledge by varying the method of presenting the reality information (visual versus verbal).

The subjects were 32 older 3-year-olds and 32 young 4-year-olds. In the visual physical condition children were shown a distinctive box and asked what they thought was

inside. They were then shown that the box contained unexpected contents. They were asked what they had thought was in the box before it was opened ("representational change" question) and what another person who was ignorant of the contents would think ("other false belief" question). In the affective task the children were shown a smiling doll and asked how they thought she felt (happy). They were then shown a picture the doll had drawn depicting her real emotion (sad). Following this, the representational change and other false belief questions were asked. The verbal condition was identical except that the reality information (the content of the box, the emotion being experienced) was presented verbally rather than visually.

Performance was greater in the affective domain compared to the physical domain for the 3-year-olds and to a lesser extent for the 4-year-olds. Reasons for the domain differences are discussed, such as the degree of verifiability of the reality information, children's experience and interest in the affective domain, children's understanding of desire, and differences in task demands. The method of presenting the reality information (visual/verbal) had little effect on performance. The relevance of this result to theories about the effects of saliency and certainty on false belief understanding is discussed. Lastly, suggestions for future research are explored.

CHAPTER 1
INTRODUCTION

Children and adults often attempt to influence the beliefs of others by expressing an emotion that differs from the one being experienced. For example, a child may smile and laugh in order to persuade his friends he is having fun when he is actually feeling frightened. The knowledge that one can be misled by an emotional expression (or have a false belief about another's emotion) allows for increased skill in interpreting situations and communicating with others.

Research on misleading facial displays has focused primarily on children's understanding of display rules or principles that guide a person's regulation of emotional expression (Ekman & Friesen, 1975). The rule "Smile when you receive a gift even if you don't like it" is an example. Children's knowledge and use of these rules have been investigated in many studies (Cole, 1986; Davis, 1992; Gnepp, 1983, Gnepp & Hess, 1986; Saarni, 1979, 1984). The appearance/reality distinction (the understanding that a person may look one way but feel another) has also been studied (Friend & Davis, 1992; Gross & Harris, 1988; Harris, Donnelly, Guz, & Pitt-Watson, 1986). These studies,

however, have rarely addressed children's understanding of false beliefs. The knowledge that a person can have a false belief about another's emotion based on a misleading facial expression is an important cognitive component of display rule understanding. In order for children to use their facial displays to intentionally manipulate the beliefs of others, this type of knowledge must be present. Despite the importance of this cognitive ability little is known about its emergence and progression in the affective realm.

In contrast, a great deal of research has focused on the development of false belief understanding in the physical domain. The results of many studies indicate that around the age of 4 children begin to understand that a person can have a belief about an object's identity or location that differs from reality. It has been suggested that false belief knowledge in the physical domain is related to cognitive developments in children's representational abilities. If a general change in cognitive abilities is occurring, then we may expect to see understanding in the emotional and physical domains emerge at approximately the same age. However, the argument has also been made that emotions, being mental states, are different from physical entities and development in this domain may be somewhat delayed (Gross & Harris, 1988).

The purpose of this study is to compare children's understanding of false beliefs in the affective and physical

domains. Methods of facilitating the demonstration of false belief understanding in both domains will also be explored. Since most of the research on false belief understanding and the facilitation of this knowledge has focused on the physical domain, this area will be discussed first and the work on affect will follow.

Children's Understanding of False Belief

When explaining or predicting the actions of others, adults often refer to internal mental states such as beliefs, desires, and preferences. The understanding of the causal relationship between these internal mental states, the external world, and behavior has been termed a "theory of mind" (Bretherton & Beeghly, 1982; Premack & Woodruff, 1978; Wellman, 1985). The demonstration of theory-type knowledge requires more than simply ascribing true beliefs to another. This could be accomplished by stating reality without any true understanding of beliefs. A stronger test requires that children be able to ascribe beliefs to others that differ from their own, and then understand that others will act in accordance with their own belief even if it is incorrect. The knowledge that someone can hold a belief that differs from reality has been considered the "litmus test" for a theory of mind (Wellman, 1985).

The Physical Domain

Two types of tasks have been used to investigate children's understanding of false beliefs in the physical

domain. In an unexpected location task (usually acted out with dolls and toys) the child watches as a protagonist hides an object in one location and leaves the scene. While the protagonist is gone, the object is moved to a new location. When the protagonist returns, the child is asked where he or she will look for the object. In a similar type of task (unexpected contents), children first experience the same situation that they are then asked to predict for the other person. The children are shown a distinctive box such as a crayon or candy box and asked what they think is inside. They are then shown that the box contains something unexpected such as pencils. The experimenter asks the children what they thought was inside the box before the contents were shown to them (representational change) and what a different person who had not seen the contents would think (other's false belief). A great deal of research indicates that 2- to 3-year-olds typically fail on these types of tasks whereas 4-year-olds pass (Gopnik & Astington, 1988; Gopnik & Slaughter, 1991; Hogrefe, Wimmer, & Perner, 1986; Perner, Leekam, & Wimmer, 1987; Wimmer & Perner, 1983). Young children even have difficulty with very simple false belief tasks where they are explicitly told reality such as "Sam's puppy is in the garage" and that the protagonist has a false belief "Sam thinks his puppy is under the porch" (Wellman, 1991). Using careful control measures researchers have ruled out information-processing

skills, memory abilities, and questioning techniques as potential problems with these types of tasks (Gopnik & Astington, 1988; Moses & Flavell, 1990; Wimmer & Hartl, 1991)

As described above, the unexpected contents task measures two types of false belief understanding--the knowledge that you once held an incorrect belief (representational change) and the knowledge that another person's belief will be false. Research on the relative difficulty of representational change understanding and other false belief knowledge has been inconsistent. Some studies suggest that understanding another's false belief is more difficult than knowing that your own belief has changed (Perner, Leekman, & Wimmer, 1987). However, with slight modification of question wording other researchers have found the opposite--that understanding your own belief change is more difficult (Gopnik & Astington, 1988). More recent studies have indicated that these two types of understanding emerge at approximately the same time (Lewis & Osborne, 1990; Sullivan & Winner, 1991; Wimmer & Hartl, 1991).

Although a great deal of research suggests that 3-year-old children have severe difficulties with false belief understanding, some studies find that under certain conditions evidence of this ability appears before the age of 4. Studies have indicated improvement in the abilities

of 3-year-olds when a) the temporal nature of the question has been clarified; b) children have made judgments about mental states other than fact beliefs; c) the salience or certainty of the reality information is reduced; d) the false belief is made more salient; and e) children are asked to explain actions rather than predict actions based on false beliefs. Each of these conditions will now be discussed.

Perhaps the simplest explanation for failure on false belief tasks is that young children do not correctly interpret the questions being asked. Lewis and Osborne (1990) and Siegal and Beattie (1991) found evidence that clarifying the temporal nature of the question helped young children. When asked "What did you think was inside the box before I took the top off?" in an unexpected contents task, children's performance was significantly better than in the two standard question conditions ("What did you think was in the box?" and "What did you think was in the box when the top was still on it?"). In fact, there was no difference in the performance of 3- and 4-year-olds when "before" questioning was used (Lewis & Osborne, 1990). Similarly, in an unexpected-location task (Siegal & Beattie, 1991) performance improved with the addition of the word "first" to the question ("Where will Jane look first?"). Although impressive, the findings of these studies should be interpreted with caution. Other researchers have presented

false belief questions in a variety of ways without improving 3-year-olds' performance. In addition, many studies include the same types of questions in control conditions and find that children have no difficulty interpreting the questions in the control context (Gopnik & Astington, 1988; Moses, 1990; Moses & Flavell, 1990; Wimmer & Hartl, 1991).

There is also evidence that children's poor performance is restricted to the understanding of beliefs (as opposed to other mental states) and even more specifically to beliefs about facts. For example, Gopnik and Slaughter (1991) found that although 3-year-olds could not report changes in their own beliefs they were able to report changes in their past pretenses, images, perceptions, and to some extent, changes in their past desires and intentions. Similarly, 3-year-old children were able to report another person's desires and pretenses when they differed from reality but not beliefs that differed (Lillard & Flavell, 1991). Flavell, Flavell, Green, and Moses (1990) suggest that 3-year-old children may even be able to report certain types of beliefs that differ from their own as long as there is no clear conflict with reality. The young children in this study understood that another person could have value beliefs, such as the taste of a cookie or the attractiveness of a flower, that differed from their own beliefs. These same children could not understand that the other person could think that a cup that

was really blue was white (a fact false belief). Value belief tasks as well as tasks involving other types of mental states such as desires may be easier for young children because there is no conflict with a verifiable reality.

This improved performance on value types of beliefs seems to be fragile and was not replicated in a recent study (Flavell, Mumme, Flavell, & Green, in press) which used pictures and stories to illustrate the other person's deviant beliefs. The authors explain these inconsistent findings by suggesting that having an actual person enacting the differing value belief, as in the first study (Flavell et al., 1990), may have made her deviant belief more salient. The Flavell et al. (in press) study also indicated that 3-year-olds have difficulty understanding that others can have differing beliefs about morality (it is okay to steal) and social conventions (it is okay to put your foot on the dinner table) as well as facts and values.

Some researchers have argued that tasks reducing the salience or the certainty of the reality information improve the performance of young children even on fact types of beliefs. According to Fritz (1990), the saliency of the real information overwhelms children and interferes with their performance on false belief tasks. In a preliminary study using an unexpected contents procedure, Fritz suggested that the saliency of reality was reduced by

showing children a box that was unexpectedly empty (rather than containing an unexpected object). Even young 3-year-olds did quite well on this task. Similarly, Zaitchik (1991) argued that the certainty of the real information in her unexpected-location task was reduced by telling the children the real location, rather than showing them, improving the performance of even young 3-year-olds. Zaitchik's task contained three conditions all involving an actor who wanted to deceive another. The standard condition was similar to the typical unexpected-location task except that an actor stated an intent to hide the object from the protagonist as the object was being moved to the new location. In the second two conditions the actor tells the subject from the beginning that he is going to deceive the protagonist about the location of the object. In one condition the actor tells and shows the subject the location of the object. In the second condition the actor only tells the subject the real location. Four-year-olds performed equally well on all conditions. Three-year-olds, however, performed well only in the verbal condition (performance did not differ in the other two conditions). Although Zaitchik suggested that verbal presentation made the object's real location less certain, she also noted that there were other indicators of uncertainty in this particular task and that children may not always consider verbal presentation of information less reliable. Fritz has interpreted Zaitchik's

task slightly differently, arguing that the saliency of the real information was reduced by verbal presentation rather than the certainty.

Wellman and Bartsch (1988) have found that when the real location is unknown or an object is actually located in two places children will correctly predict an actor's actions based on his or her beliefs. For example, when children are told that Sam's puppy may be hiding under the porch or in the garage but Sam thinks he is under the porch they correctly predict where Sam will look. If children know there are magic markers in the desk and in the closet and the story character believes they are only in the desk children once again correctly predict the actor's actions. The findings from this study are also consistent with previous reasoning that children have less difficulty with tasks involving beliefs that do not violate a known physical reality.

The importance of saliency is also demonstrated in a recent study on deception (Russell, Mauthner, Sharpe, & Tidswell, 1991). As will be discussed later, young children typically do well on deception tasks. However, in this study 3-year-olds did particularly poorly. The children were shown two boxes with the contents visible to them. One box contained a piece of candy. If the children misled the experimenter about the location of the candy, the child got to keep it; otherwise the experimenter received the candy.

Many 3-year-olds continued to point to the box containing the candy and thus could not keep it, for the full 20 trials. The researchers argued that the perceptual availability of the real location of the candy increased its saliency and contributed to the difficulty of this task.

There is an additional role differing from the one described above that saliency may play in the facilitation of 3-year-olds' understanding. Some studies seem to increase the performance of 3-year-olds by emphasizing the false belief or the contrast between reality and the false belief. In fact the studies reviewed next appear to have little in common except that the contrast between reality and the false belief is made more salient in a variety of ways, perhaps alerting children to, and focusing them on, the existence of the false belief. Sullivan and Winner (1991) compared the performance of young, medium, and older 3-year-olds on a standard version of the unexpected contents task, a version which highlighted the fact that the child had been tricked and explained the source of the false belief, and a version which involved playing a trick on another. These researchers found that performance improved for both the representational change and other false belief question in the experimental conditions as compared to the standard condition but only for the older 3-year-olds (M = 3:9).

Cues to another's false belief were also made more salient in Moses and Flavell's (1990) study of 3-year-olds. Video tapes were shown to the children depicting false belief situations. To make the false belief salient the characters always stated their goal (this did not have to be inferred). In addition, the children were given cues about the actors' false beliefs from their actions and in some cases their reactions to finding something unexpected. In the most supportive condition Cathy finds a box of crayons in a bag and she then goes to get some paper to draw. A clown comes in and announces that she is going to play a trick on Cathy. The clown hides the crayons in a drawer and puts rocks in the bag. Cathy enters the room, looks in the bag, looks surprised there are rocks, and expresses her surprise.

The results of this study suggested that the children were helped by the cues about the false belief. The more cues that were provided the better the children performed. However, their performance was very low in all conditions and was never above chance. In a second experiment using an unexpected contents task, the actors also stated their goal and looked surprised when the object in the box was different from expected. Performance on this task was very low. However, Moses, who later found good performance on a similar task (Moses, 1992), suggested that the poor performance in Moses and Flavell's second experiment was due

to the visibility of the unexpected object (a car in a band-aid box) during questioning, which could have been a salient reminder of the real object. The first study reported by Moses and Flavell (1990) found poor performance even when the reality information (rocks) was not visible to the child. However, the task used in the Moses and Flavell's first experiment differed slightly from that used in their second experiment and Moses's (1992) study.

Moses (1992) suggests that 3-year-old children's understanding of false beliefs is only demonstrated under a limited range of supportive conditions. He used filmed situations similar to those described in Study 2 of Moses and Flavell (1990). In Moses' (1992) first study a character announces his intention to play with a toy. He opens the box, finds an orange peel, and reacts with surprise and sadness. This task differed from Moses and Flavell's study 2 task in several ways. First, the orange peel was put back in the box (out of view) before the false belief questions were asked. Second, there was a greater contrast between what was expected (a positive item) and reality (a negative item). Third, the children were given a review (using the video tape) of the previous events before the questions were asked. On this task 3-year-olds performed better than in most other studies and their performance was even greater than chance. Performance in this study may also have been elevated due to the use of a

pretest that screened out approximately 30% of the original sample.

In a second study performance on tasks similar to the above (except in one condition where the intention was not explicitly related to the false belief) was compared to performance on a task that more closely resembled a standard false belief measure. In the standard task children were shown a raisin box that had trash in it. The experimenter showed surprise at finding trash and then asked the child what another person would think was in the box. Although similar to traditional measures of false belief, this task still differed in several respects. First, it contained a positive and negative contrast between what is expected and reality (raisins vs. trash) and second, the experimenter demonstrated a surprised reaction. Children performed better on the experimental tasks than on the revised standard task, but since a traditional standard task was not included, it is difficult to know if the changes in the revised standard task benefitted the children (although the percentage of children passing suggests that perhaps the extra cues did help).

In spite of the evidence presented above, some studies have provided children with supportive conditions and have not demonstrated any understanding of false belief knowledge. Flavell et al. (1990) showed children a blue cup that was behind a barrier. The protagonist then came into

the room and stated that she believed the cup behind the barrier was white. The children were asked what color the protagonist thought the cup was. They merely needed to repeat the statement the protagonist had just made; however, the 3-year-olds tended to report that she thought the cup was blue. Findings such as these were reported in other tasks even when salience conditions supported the correct answer: The real object was out of sight (covered up) and the expected object (cake) differed greatly from the real object (cat food). However, it is important to note that the children participating in this research were very young ($\underline{M}$ = 3:3 in one study and $\underline{M}$ = 3:1 in the other).

Another way to make the contrast between the real and false belief more salient is through the use of deception. As described earlier, Sullivan and Winner (1991) simply changed the wording in a standard unexpected content false belief task to include playing a trick and this seemed to facilitate the performance of older 3-year-olds. Freeman, Lewis, and Doherty (1991) found false belief understanding facilitated when information was presented in a hide-and-seek game. In this task the father peeked while the child was hiding and then the child moved again after he peeked. The authors argue that this situation makes more salient the actor's intention to act on his belief (the actor is seeking knowledge); however, it is also the purpose of a hide-and-seek game to fool another person.

It has been suggested that deception tasks require fewer verbal skills and may be purer tests of false belief understanding than standard tasks (Russell et al., 1991). Children are capable of deceptive actions when they are quite young. Naturalistic studies report incidences of deception around the age of 2 (Dunn, 1988). In a laboratory study Lewis, Stanger, and Sullivan (1989) found that only 38% of 3-year-olds admitted to a transgression (having looked at a toy when asked not to). These and most other deception studies have been criticized for demonstrating that children change their behavior without demonstrating that they have any understanding of influencing another's beliefs. Recently researchers have specifically investigated whether children are trying to manipulate another's beliefs when they mislead.

Two studies suggest that young children may not only be capable of deception but may even be targeting the beliefs of others (Chandler, Fritz, & Hala, 1989; Hala, Chandler, & Fritz, 1991). Children used a puppet that made footprints to hide some treasure so that another person would be unable to find it. Strategies such as erasing footprints, creating new footprints to incorrect locations, and lying were used and were used selectively (only in situations when they were supposed to hinder others) even by the 3-year-olds. In addition, the children responded correctly to questions about the other person's beliefs concerning the treasure's

location. Sodian, Taylor, Harris, and Perner (1991), however, were unable to replicate these findings using similar procedures. They found no selective use of strategies and cite small differences in the procedures of the two studies as a possible explanation for the differences in performance. Also contrary to Hala et al., in the study of Sodian et al. the children did not correctly predict where the protagonist would look for the treasure. Using various prompts, Hala et al. (1991) had been able to get children to lay false trails whereas Sodian et al. (1991) were unsuccessful. Sodian et al. suggest that perhaps in some conditions a salient misleading cue can prompt a child about another's false belief such as when a false trail is leading to an empty container. The existence or absence of these trails may have differentially influenced the ability of the children to report another's false belief in the two studies.

Lastly, the false belief understanding of children may be facilitated by asking them to explain actions rather than predict them. Bartsch and Wellman (1989) found that when children explained actions they appealed to an actor's beliefs. In a typical task the children were told that Jane was looking for her kitten under the couch but the kitten was under the piano. When asked to explain Jane's behavior, even 3-year-olds gave false belief explanations. Children were able to explain actions using false beliefs even if

they could not predict actions. Flavell and Moses (1990) also included an explanation condition in their study and found similar results. They, however, differed in their interpretation of the findings. Flavell and Moses suggest that improved performance on explanation measures is due to an associative bias built into the task. Children may answer correctly because the protagonist has been heavily associated with the correct response. Wellman (1990) has recently reanalyzed the data from the previous study and finds that most of the evidence of false belief understanding comes from older 3-year-olds only. These explanation tasks also provide children with action cues as to the belief of the actor which may influence performance.

Most researchers believe that 3-year-olds' problem with false belief tasks involves their limited understanding of representation (Astington & Gopnik, 1988; Flavell, Green, & Flavell, 1990; Perner, 1991). In order to understand false beliefs, children must have representations of reality and must also understand the nature of a representation, that is, that representations can be many and do not necessarily match reality. This knowledge has been termed "metarepresentational" since it involves both having a representation and understanding it as a representation (Perner, 1991). Researchers have aligned themselves along a continuum regarding the degree of 3-year-olds' false belief understanding. At one end are those who suggest that 3-

year-olds suffer from a cognitive deficit and are, therefore, very limited in their knowledge of false beliefs (Astington & Gopnik, 1991; Moses & Flavell, 1990; Perner et al., 1987). Other individuals think that the cognitive abilities are present in 3-year-olds but the typical tasks do not tap their knowledge (Hala, Chandler, & Fritz, 1991; Leslie, 1988). In the middle are those who suggest that false belief knowledge is not an all-or-none entity but develops gradually between the ages of 3 and 4, eventually becoming stronger and less task dependent (Moses, 1992; Wellman, 1990).

The studies presented in this review suggest that, although 3-year-olds' understanding is rarely equal to that of older children, there are instances when these younger children demonstrate some degree of knowledge. It is important to be cautious, however, when interpreting these findings. In many cases demonstrations of false belief understanding in young children have not been replicated or attempted replications have been unsuccessful. These findings also can often be interpreted in terms of task or questioning demands that may affect the children's answers.

This review raises several important issues concerning the study of young children's false belief understanding. First, it is unclear under what circumstances facilitation of performance occurs. Some studies make several changes to the standard task and find improvement. It is difficult to

discern which of these changes (independently or in conjunction with others) are important for performance enhancement. Other studies do not include a standard task and, therefore, it is difficult to determine if performance is improved. Young children also seem particularly sensitive to small task or demand characteristics in this domain. Small and even unintentional differences in tasks may affect performance. It is necessary to define the conditions that reliably yield improved performance using standardized procedures.

Conditions that facilitate performance in one type of false belief task should be explored in other tasks. Perhaps, as Zaitchik (1991) suggests, verbal information is only considered less certain in some situations when other cues are also available. It is also possible that conditions which improve performance in an unexpected location task may have a different effect in an unexpected contents task in which the children actually experience the false belief themselves.

Some researchers have discounted the improvement in 3-year-olds' performance under supportive conditions (Moses & Flavell, 1990). Even at best their performance is often less than chance level. However, it would seem that a significant improvement has implications for the importance of different conditions for facilitation of understanding regardless of the overall level of performance.

False belief knowledge develops rapidly between the ages of 3 and 5. Differences have been found in the performance of young 3-year-olds versus old 3-year-olds. The age range and mean of the sample can have an effect on the findings even within a particular age group. Conclusions about the abilities of young 3-year-olds may not be generalizable to older 3-year-olds. If age 3 is a transitional period, then older 3-year-olds may be sensitive to a much wider range of facilitating conditions than younger ones. In this domain the age range of the sample is a critical factor. The effect of using a pretest to exclude children from a study also needs to be considered. This may limit the generalizability of the findings.

As the discussion above suggests, a great deal of research has focused on describing and understanding the development of false belief knowledge in the physical domain. Much less effort has been directed toward exploring children's understanding of affective false beliefs. This research will be reviewed next.

The Affective Domain

Individuals not only have false beliefs about objects and locations but they can also be misled about another's mental state such as an emotion through the use of a facial display. Knowledge of the misleading impact of facial displays depends upon an understanding of affective false beliefs. Most of the research on cognitive skills involved

in affective understanding has focused on a domain related to false beliefs--children's understanding of appearance/reality (A/R). When do children understand that a person may feel one way but look another?

Harris, Donnelly, Guz, and Pitt-Watson (1986) told children stories about a protagonist who was in a situation that would elicit a particular emotion (receiving a disappointing gift) and had a reason to hide the emotion (did not want to hurt the gift giver's feelings). The children were then asked what the protagonist felt and what emotion he or she displayed. The researchers found that children as young as 4 years old indicated some understanding of A/R but only in conditions when a negative emotion was being hidden. Performance improved dramatically by age 6. A second study found similar results (Friend & Davis, 1992), with 4-year-olds once again demonstrating knowledge primarily when negative emotions were hidden. Friend and Davis also compared children's A/R understanding in the affective and physical domains and found that performance did not differ when the tasks used in the two domains were equated on a variety of dimensions such as perceptual availability. These studies, however, did not assess children's understanding of the misleading impact of emotional displays on another person.

In the affective, as in the physical, domain children demonstrate deceptive behaviors (in this case emotional

displays) very early. Cole (1986) found that 3- to 4-year-old girls showed fewer negative reactions to a disappointing gift when an experimenter was present than when they were by themselves, suggesting that the children were monitoring their facial expressions. These same children, however, indicated no knowledge of the display rule on a picture/story task. Lewis et al. (1989) also found evidence of facial monitoring in their study of deception. The children (3-year-olds) were asked not to look at a toy while the experimenter was out of the room. When the experimenter returned, the children were questioned about their behavior. An analysis of video tapes showed that the children who looked at the toy and lied about it showed more positive expressions than the children who did not look (and were, therefore, telling the truth). Adult raters were unable to determine which children were lying.

Attempts to manipulate another, using affect, have been noted in children as young as 2 years old. For example, Dunn, Bretherton, and Munn (1987) cite the following exchange between a 24-month-old and her mother involving a piece of chocolate cake (p. 136):

> Child: Bibby on.
> Mother: You don't want your bibby on. You're not eating.
> Child: Chocolate cake. Chocolate cake.
> Mother: You're not having any more chocolate cake either.
> Child: Why? (whines) Tired.
> Mother: You tired? Ooh!
> Child: Chocolate cake.
> Mother: No chance.

This research, however, does not provide evidence that children are trying to manipulate the beliefs of others. The children could have simply learned display rules (such as look happy when you receive a gift) or they may have learned that certain displays affect another's behavior (you do not get in trouble, or you get what you want) without any knowledge of effects on the beliefs of another person. Cole (1986) and Gross and Harris (1988) suggest that very young children have no understanding of misleading another through the use of display rules. The rules are used because they have been taught. The knowledge that individuals are being misled develops later through experiencing the reactions of others to the facial displays.

Only two studies have directly addressed children's understanding of affective false beliefs. Similar to Harris et al. (1986), Gross and Harris (1988) used a display rule paradigm telling children about a situation that would elicit a certain emotion and a reason for the protagonist to hide that emotion. In addition to the A/R questions, the children were asked what another person in the room would think the protagonist felt. The children did not indicate an understanding of misleading emotional displays until age 6. These authors suggested that understanding false beliefs about emotions may be more difficult than understanding false beliefs about objects or locations. An emotion is a representational state itself. In this task the children

had to infer that another would have a belief about an emotion about an event--actually requiring a second-order representation.

There were, however, methodological problems with Gross and Harris's study which may have led to an underestimation of the abilities of younger children. For example, the children had to infer the apparent emotion from the motive information given in the story. Most of the 4-year-olds were unable to infer the correct apparent emotion; therefore, when asked what another person in the room would think the protagonist felt, they tended to answer incorrectly. Supplying children with the correct apparent emotion might have improved their performance.

In a second study, Gross (1989) compared the false belief performance of children on a physical task (similar to an unexpected contents task) and an affective task. The procedures for both tasks were equated. In the physical task children were shown pens with color caps covering them. They were then shown that the pens wrote a different color than the cap suggested. To investigate children's false belief understanding of emotions, Gross presented 3- and 4-year-olds with a doll wearing a mask. When the mask was removed the "real" emotion was revealed on the doll's face. To simplify the task and be consistent with the physical measure, no display rule or context was given for the affective task. She found that 4-year-old children

performed better than 3-year-olds on both tasks and more importantly there were few differences in performance on the two tasks, with one exception. Four-year-olds did more poorly on the question about their own initial belief in the emotion task than in the physical task.

This study suggests that the ability to understand false beliefs about affect may develop in conjunction with the ability to understand false beliefs in the physical domain. However, there is reason for caution. Gross's task may not have tapped an understanding of hiding emotions through facial displays as much as an understanding of using a physical object (a mask) to cover another physical object (facial expression) and hide it. This task did not represent the internal nature of emotions or evaluate the understanding that internal feelings can be misrepresented by misleading facial displays. Gross and Harris (1988) seem to suggest that it is the internal nature of another's emotion that may contribute to greater difficulty in the understanding of false beliefs about affect. Gross also did not use a standard physical task or standardized questioning procedures in her study. This makes comparison of her results to other studies difficult.

Comparison of the Affective and Physical Domains

The studies presented above offer conflicting predictions about the comparison of false belief understanding in the affective and physical domains.

Gross's (1989) study suggests that false belief understanding may develop concurrently in the domains, a view that is also supported by the findings of similar performance on physical and affective A/R tasks (Friend & Davis, 1992). These studies support the hypothesis that a general metarepresentional change is occurring in the thinking of young children that affects cognition across a variety of domains (Astington & Gopnik, 1988; Flavell, Green, & Flavell, 1990; Friend & Davis, 1992). Other research suggests that false belief understanding of emotions may develop later. According to Gross and Harris (1988) it may be more difficult for psychological entities (such as emotions) to be targets of false beliefs than physical objects or locations. Therefore, affective understanding may not develop until about age 6.

A third possibility is that false belief understanding in the affective domain may be slightly accelerated. It has been argued that children show improved false belief understanding in situations where there is no salient verifiable reality. An emotion is an internal event and, therefore, beliefs about emotions are perhaps less verifiable than other types of fact beliefs. Individuals may be less certain about the reality of an emotion, which they can not see, than the reality of an object or location that they can see. Another type of evidence that may support the acceleration hypothesis involves naturalistic observations

of children's use of emotion terms in social interactions (Brown & Dunn, 1991; Dunn, Bretherton & Munn, 1987). Children show a great deal of interest in emotion from a very early age. They acquire their first feeling words between the ages of 18 and 20 months (Bretherton, Fritz, Zahn-Waxler, & Ridgeway, 1986). During their second year they begin to talk about causes and consequences of feeling states (Bretherton & Beeghly, 1982) and take on pretend emotions. They can also use their emotional understanding to attempt to change another's behavior as discussed earlier (Dunn et al., 1987). The onset of the use of cognitive mental state terms tends to lag behind the references to emotions. Perhaps all of this interest, experience, and talk about emotion states facilitates children's understanding of affective false beliefs. In addition, this evident interest in emotions suggests that affective tasks might be very involving for children.

One purpose of the present study was to compare children's understanding of false belief in the affective and physical domains using an unexpected contents task. This type of false belief measure seems most appropriate for use in the affective domain. For example, a box can contain a hidden unexpected item and a person can experience hidden unexpected emotion. The tasks have been designed to address some of the criticisms of the previous two studies on affective false beliefs. First, performance on the emotion

task was compared to performance on a standard unexpected contents version of the physical false belief task. Since typically no context is provided in the standard physical task this same approach was used for the affective measure (no display rules were provided). The two tasks (affective and physical) are similar in the presentation of real and false belief information, and the questioning format. Secondly, the affective task more clearly represents the internal nature of emotions than did the task designed by Gross (1989).

Affective understanding was measured in this study by showing children a smiling doll and asking them what she was feeling. They were then shown a folder containing a picture that the doll drew depicting her true emotion--sadness. This method of presentation of the real emotion represents the internal private nature of affect. In this condition the real contents of the box and the real emotion were both presented visually.

A verbal condition was also included which was identical to the visual condition except that the reality information was presented to the children verbally in both domains. There were several reasons for the inclusion of this condition. First, there was a question of ecological validity. The internal emotions of another person are often not perceptually available, especially if a person is trying to hide his or her feelings. It is more likely children

would become aware of another's real emotions verbally rather than through a physical representation. Second, consistency of results across several methods of presentation reduces the possibility that the findings are due to differences between the tasks themselves in the two domains. Lastly, research has suggested that verbal presentation of reality information may facilitate the performance of young children (Zaitchik, 1991). Previously this facilitating effect was demonstrated in an unexpected location task. The second purpose of the study, therefore, is to investigate the facilitating effect of verbal presentation of the reality information in a second type of task (unexpected contents) in two domains.

A drawing control condition was also included. Since the real emotion was depicted using a drawing made by the doll (in order to depict the internal nature of affect), a condition was also included in which the children were shown a drawing of the contents of the box in the physical task. This was done to ensure that any differences found in the two domains would not be due to presenting the real object in the physical task and presenting a pictorial representation in the affective task. Of course results that are consistent across both the visual and the verbal conditions would argue against this possibility. Pictures (photographs) have also been used in previous research comparing the understanding of a related cognitive skill,

appearance/reality, in the affective and physical domains (Friend & Davis, 1992) suggesting that this is a reasonable way to portray emotional information in a comparison of physical and affective knowledge.

The importance of restricting the age ranges of the groups of children being studied has been discussed previously. The current study investigated the abilities of children between the ages of 3 1/2 to 4 and 4 to 4 1/2. Based on previous research it was believed that the old 3-year-olds would be most sensitive to any facilitating effect of the verbal presentation or difficulties between the domains. Children older than 4 1/2 were not included due to a concern that they may be subject to a ceiling effect based on performance found on similar tasks in Lewis and Osborne's (1990) study.

Several predictions were possible based on previous research. First it was expected that the performance of 4-year-olds would be less influenced by the method of information presentation (verbal vs. visual) and the type of domain (affective vs. physical) than the 3-year-olds. Traditionally, 4-year-olds have indicated an understanding of this concept across a variety of methods of presentation. In addition, on appearance/reality tasks 4-year-olds have been shown to perform equally well on physical and affective measures. Since this study uses young 4-year-olds it is

possible that they may indicate some sensitivity to these factors but this is not expected.

The old 3-year-olds were expected to be sensitive to both differences in domain and differences in condition. As discussed previously there are arguments suggesting emotion false beliefs may be easier, more difficult, or equal in difficulty compared to fact beliefs. These children were also expected to show facilitation of performance in the verbal condition across both domains. An interaction of domain and condition was not expected. Because the two methods of presentation are different ways of equating the tasks, any difference in domains should be apparent across both conditions.

A main effect of age was expected with 4-year-olds performing better on the tasks than 3-year-olds. It was considered possible that an interaction of age and condition might exist with 3-year-olds performing at the same level as 4-year-olds in the verbal condition. Lastly, consistent with recent studies, no differences in performance on the representational change and false belief questions were expected for either age group.

In the current study, domain (affective and physical) and question type (representational change and false belief) were within-subject variables. The method of presentation (verbal and visual) was a between-subject factor. Age and gender were also considered.

CHAPTER 2
METHOD

Sample and Materials

Subjects

The subjects were 32 children (17 girls and 15 boys) between the ages of 3:6 and 3:11 (M = 3:9) and 32 children (15 girls and 17 boys) between the ages of 4:0 and 4:6 (M = 4:4) from various preschools in the Gainesville area. Parents were notified of the study by means of a letter and parental written permission was obtained for participation.

Materials

A crayon box with a role of tape inside, a band-aid box, and a drawing of a pencil were used for the physical tasks. The emotion task required a smiling doll (38 cm) and a folder containing a drawing of the doll looking sad (13 cm X 13 cm). The picture was a schematic drawing resembling the doll in several respects such as hair color and hair style. A large (40 cm) hand puppet ("Bert" from Sesame Street) served as the "other" to whom the children ascribed false beliefs.

Procedure

Each child was interviewed individually by two female experimenters at the child's preschool. One experimenter presented the tasks and questions to the child while the other recorded the responses. The children were randomly assigned to either the visual or verbal condition. Each child participated in both a physical and an affective task and the order of presentation was counterbalanced within each condition. The drawing control task (physical task using a picture of the box contents) was presented to every child after the other tasks were completed. Before beginning the session the children were introduced to the puppet "Bert" and told that Bert would be put away for a while so that the experimenter could show them something she did not want Bert to see. Bert was then closed up in a box and pushed under the table and the session began. The scripts used in the study are provided in the Appendix.

Physical Task

In the visual condition the children were shown a crayon box and asked what they thought was inside. If they did not answer their attention was drawn to the outside of the box. The children were then shown that there was a roll of scotch tape in the box. The tape was returned to the box, and the box was closed back up. The children were then asked if they remembered what was inside the box (a memory control question). If the children did not answer or

answered incorrectly the contents were shown to the child again and then returned to the box. The memory question was repeated. The children were then asked "What did you think was in the box before I took the top off" (representational change question)? If the children did not answer, a probe question was asked "Did you think there was tape or crayons inside the box before I took the top off?" The order of correct (crayons) and incorrect (tape) information in the probe question was counterbalanced within each condition. Following the representational change question, the puppet "Bert" was taken out of the closed box. The children were told that Bert would be playing the game for the first time and had never seen what was inside the box. They were then asked "What will Bert think is inside the box before I take the top off (other false belief question)?" If a child did not answer, a probe question was used. Bert was then returned to the box and put under the table.

The verbal condition was exactly the same except that the children were told what was in the box instead of being shown. If they failed the memory control question they were told again what was in the box and the memory question was repeated. The representational change question was "What did you think was inside the box before I told you?" and the other false belief question was "What will Bert think is inside the box before I tell him?"

Affective Task

In the visual condition the children were shown a smiling doll and told her name was Patty. They were asked how Patty feels. If they did not answer or gave an inappropriate answer they were asked if Patty feels happy or sad. All of the children responded correctly when given the probe. The children were then shown a folder which was opened to reveal a picture that Patty drew of how she felt inside. The drawing depicted a sad expression. The folder was closed back up and the children were asked the memory control question "Do you remember how Patty feels inside?" As with the physical task children who answered incorrectly were shown the drawing again and the memory question was repeated. They were then asked the questions about their own belief change and the false belief of another (Bert). Probe questions were used when the children did not spontaneously answer. Once again the procedure was identical for the verbal condition except that the information about the real emotion was presented verbally rather than visually.

Physical Drawing Control Task

This task was always presented at the end of the session. The procedure was identical to the physical visual task except that the children were shown a drawing of what was inside the box. A band-aid box was presented and the children were asked what they thought was inside. They were

then shown a picture of what was really inside the box (a pencil). The picture was put away and the memory control question was asked. If the child answered incorrectly the picture was shown to him or her again and the memory question was repeated. The representational change and false belief questions followed. Probe questions were used if the children did not answer.

Scoring

In order to be scored correct on the representational change question and the false belief question the children must also have answered the memory control question correctly. There were only two instances when a child was unable to answer the memory control question about the real contents or real emotion after a second demonstration. One 3-year-old incorrectly answered the emotion question and one 4-year-old was incorrect on the drawing task. These data were included but the answers were coded as incorrect.

Whether children passed the memory question on the first or second presentation was recorded as well as the need for probe questions. The experimenter also noted whether the child referred back to the outside of the box or to the doll's face when answering the questions (by looking, pointing, etc.).

CHAPTER 3
RESULTS

Preliminary analyses indicated that there were no main effects or interactions of order or sex with the other variables. Thus, order and sex were excluded from all further analyses.

Comparison of Domains and Methods of Presentation

Performance in the physical and affective domains was compared using a multi-way frequency categorical modeling technique (CATMOD in SAS). The percentages of correct responses are provided in Table 3-1. The main questions of interest concerned the pattern of results for each age. Thus a 2 X 2 X 2 (Method of Presentation: Verbal/Visual X Domain: Affective/Physical X Type of Question: Representational Change/Other False Belief) CATMOD analysis was performed separately for each age. The analysis on 3-year-olds indicated a main effect of domain, $\chi^2(1, \underline{N} = 32) = 13.33$, $\underline{p} < .0003$. These children performed better on the affective task (44% correct) than on the physical task (17% correct) and this finding was consistent across presentation type and representational change/other false belief questions.

TABLE 3-1

Percentage of Correct Responses as a Function of Domain, Method of Presentation, Type of Question, and Age

	Presentation Method	
Domain/Question Type	Visual	Verbal
	3-Year Olds	
Affective Domain		
Representational Change	50	44
Other False Belief	44	38
Physical Domain		
Representational Change	19	19
Other False Belief	13	19
	4-Year-Olds	
Affective Domain		
Representational Change	69	81
Other False Belief	56	44
Physical Domain		
Representational Change	38	75
Other False Belief	44	44

Note. Within each age and method of presentation $n = 16$.

The analysis for the 4-year-olds indicated a Type of Question X Presentation interaction, $\chi^2(1, \underline{N} = 32) = 4.30$, $p < .038$. Follow up tests showed that in the visual condition there was no difference in performance on the representational change question (53% correct) and the other false belief question (50% correct), $\chi^2(1, \underline{N} = 16) = .34$, $\underline{p} < .559$. In the verbal condition performance on the representational change question (78% correct) was better than on the other false belief question (44% correct), $\chi^2(1, \underline{N} = 16) = 6.79$, $p < .009$. Furthermore, there was no difference in performance on the other false belief question between the verbal and visual domains. There was, however, a significant difference on the representational change question, $\chi^2(1, \underline{N} = 32) = 4.97$, $\underline{p} < .025$. Performance was better in the verbal than the visual condition.

To compare the performance of the two age groups a 2 X 2 X 2 (Age X Domain X Method of Presentation) CATMOD analysis was performed on the representational change and other false belief questions separately. For the representational change question an age main effect was found, $\chi^2(1, \underline{N} = 64) = 13.75$, $\underline{p} < .0002$, with 4-year-olds correct more often (66%) than 3-year-olds (33%). A domain main effect was also significant, $\chi^2(1, \underline{N} = 64) = 8.98$, $\underline{p} < .0027$. Overall, children performed better on the affective task (59% correct) than on the physical task (39% correct). The pattern of results was the same for the other false

belief question. The age main effect was significant $\chi^2(1, N = 64) = 5.79$, $p < .0162$, with 4-year-olds (66% correct) outperforming 3-year-olds (28% correct). There was also a significant domain main effect with performance better on the affective task (48%) than on the physical task (30%), $\chi^2(1, N = 64) = 6.74$, $p < .0094$.

Absolute Level of Performance

The next question concerns the conditions under which performance differed from chance. The performance of the children varied depending on the domain and question type. A series of binomial tests for samples greater than 25 (Siegel, 1956) found that the 3-year-olds' performance was below chance in the physical domain for both the representational change question, $z = 3.71$, $p < .001$, and the other false belief question, $z = 4.06$, $p < .0003$. In the affective domain the 3-year-olds' performance did not differ from chance on the representational change question, $z = .53$, $p < .291$, or on the other false belief question, $z = 1.23$, $p < .105$.

The 4-year-olds' performance was greater than chance in the affective domain for the representational change question, $z = -2.65$, $p < .004$, but not for the other false belief question, $z = .18$, $p < .440$. Performance did not differ from chance in the physical domain for either the representational change question, $z = .53$, $p < .291$, or the other false belief question, $z = .88$, $p < .197$.

Individual Patterns of Response

The patterns of responses across the four questions for individual children are presented in Table 3-2. Approximately half of the 3-year-olds were incorrect on all of their responses (15 out of 32). The second largest group was 3-year-olds who were correct on both of the affective questions but incorrect on both of the physical questions (n = 6). The patterns for the 4-year-olds were more diverse. The two largest groups were 1) children who were correct on all of the questions (n = 6) and 2) children who were correct on both of the affective questions and incorrect on both of the physical questions (n = 6).

Considering only children who were partially correct, there was more consistent responding within a domain (26 of the children responded correctly to both questions in one domain) than across question type (14 children answered either both representational change questions correctly or both other false belief questions correctly).

Table 3-3 reports the number of questions answered correctly by each child in one domain compared to the number of questions answered correctly in the other. Twenty-five of the 3-year-olds were incorrect on both of the physical questions compared to 15 children who were incorrect on both of the affective questions. The 4-year-olds showed a

TABLE 3-2

Number of Children Exhibiting Each Response Pattern on the Representational Change Questions (Own) and the Other False Belief Questions (Other) as a Function of Age

	Responses					
	Physical Domain		Affective Domain		Age	
Pattern	Own	Other	Own	Other	3	4
1	C	C	C	C	3	6
2	C	C	C	I	1	3
3	C	C	I	C	0	2
4	C	I	C	C	1	3
5	I	C	C	C	1	1
6	C	C	I	I	0	2
7	I	I	C	C	6	6
8	C	I	C	I	1	2
9	C	I	I	I	0	1
10	I	I	C	I	2	2
11	I	I	I	C	2	0
12	I	I	I	I	15	4

Note. C = correct response; I = incorrect response. For each age n = 32.

TABLE 3-3

Cross-Classification of Individual False Belief Performance as a Function of Age

Physical Questions Correct	Affective Questions Correct: 0	1	2	Total
		3-Year-Olds		
0	15	4	6	25
1	0	1	2	3
2	0	1	3	4
Total	15	6	11	32
		4-Year-Olds		
0	4	2	6	12
1	1	2	4	7
2	2	5	6	13
Total	7	9	16	32

similar although less dramatic pattern with 12 children missing both of the physical questions and 7 missing both of the affective ones. A Pearson product-moment correlation comparing performance on the two tasks was not significant for the 4-year-olds. A correlation was not done for the 3-

year-olds since the performance on the physical task was so poor. The individual patterns of responding support the previous CATMOD analyses suggesting that the affective task was easier and was mastered before the physical task.

The Influence of Task-Related Differences on Performance

There are several task-related explanations for the performance differences in the two domains that can be eliminated by further analysis. These explanations are investigated in the next section.

Memory for Real Object and Emotion

Children who could not answer the memory control question the first time were shown the reality information again. Performance in a domain may have been affected by the number of times the reality information was presented. First, it was important to determine whether the number of presentations in the domains differed, and secondly, if that difference affected performance.

The percentage of children who required a second presentation of the reality information to correctly answer on the physical task was 17%. On the emotion task 32% required a second presentation. A 2 X 2 X 2 (Method of Presentation X Domain X Age) CATMOD analysis indicated a significant domain main effect, $\chi^2(1, N = 63) = 5.31$, $p < .021$.

A 2 X 2 (Number of Presentations: 1 or 2 X Type of Question) CATMOD procedure was performed separately for

performance in the affective and physical domains. No significant effects were found in either analysis suggesting there was no difference in children's performance based on the number of times the reality information was presented. These data were further analyzed by age using Fisher Exact Probability Tests and once again no differences were found. The performance of children as a function of number of reality presentations is presented in Table 3-4. In addition, a 2 X 2 (Domain X Question Type) CATMOD analysis which excluded children who were presented the reality information more than once indicated the same effects of domain as the analysis that included both groups of children. For the 3-year-olds a significant domain effect was found, $\chi^2(1, 15) = 6.34$, $p < .011$, with performance better on the affective task (47% correct) than the physical task (22% correct). The performance of the 4-year-olds did not differ by domain. Thus, although a greater number of children received two presentations of the reality information in the affective domain this did not affect performance.

Comparisons of Probe Questions and References to False Belief Information Across Domains

Children who did not spontaneously answer the representational change or other false belief question were asked a forced choice probe question. If children received more probes in one domain than in the other this may have influenced performance (although the correct and incorrect

TABLE 3-4

Number of Correct and Total Responses as a Function of Age, Domain, Question Type, and Number of Reality Presentations

	Number of Responses					
	Own Belief Change			Other False Belief		
Domain/ Presentations	Number Correct	Total		Number Correct	Total	
	3-Year-Olds					
Affective Domain						
1 presentation	8	18	(44%)	8	18	(44%)
2 presentations	7	13	(54%)	5	13	(38%)
Physical Domain						
1 presentation	6	25	(24%)	4	25	(16%)
2 presentations	0	7	(0%)	1	7	(14%)
	4-Year-Olds					
Affective Domain						
1 presentation	17	24	(71%)	15	24	(63%)
2 presentations	6	8	(75%)	3	8	(37%)
Physical Domain						
1 Presentation	17	28	(61%)	13	28	(46%)
2 Presentations	2	4	(50%)	1	4	(25%)

Note. Percentages correct are presented in parenthesis.

answers were counterbalanced in the probe question). A 2 X 2 X 2 X 2 (Age X Method of Presentation X Domain X Type of Question) CATMOD analysis on the number of probe questions indicated only a main effect of age, $\chi^2(1, 64) = 4.21$, $p < .040$. The older children were asked probe questions more often (41 times) than the younger ones (22 times).

A series of Chi-Squares comparing each question in each domain indicated that there was no difference in the performance of children who responded spontaneously and the children who responded to probe questions. Once again these data were further analyzed by age using Fisher Exact Probability Tests and no differences were found. Children's performance was not influenced by the use of probe questions.

It is also interesting to determine if there were domain differences in the number of times children referred back to the information that suggested the false belief (the outside of the box, the doll's face) when answering the false belief questions. Perhaps the doll's face was a more salient stimulus than the box. Children may have attended to it more often, therefore, focusing on appearance (the correct answer) in the affective task. A 2 X 2 X 2 (Domain X Method of Presentation X Age) CATMOD procedure indicated that there were no significant differences in the number of references.

The relationship between children's referencing and their performance was investigated using Fisher Exact Probability Tests comparing the performance on each question within each age and domain. This analysis indicated no significant effects for 3-year-olds. In contrast the 4-year-olds did show significant differences in performance. On the other affective false belief question performance was better when children referenced the doll's face (74% correct) than when they did not (31% correct), $p = .020$. Performance was also better on the physical representational change question when children referenced the box (76% correct) than when they did not (40% correct), $p = .041$. Differences in performance on the affective representational change question were marginally significant, ($p = .071$), but showed the same pattern. Although both 3- and 4-year-olds referenced the reality information, only the 4-year-olds seemed to be using the box and the doll's face as cues to the correct answer.

Comparisons to the Drawing Task

A final issue is that the inclusion of a drawing in the visual affective task but not the visual physical task might have affected performance. It is unlikely that the drawing accounted for the better performance on the affective task because children's performance in each domain was consistent across methods of presentation. However, to examine this possibility further an additional analysis compared

performance on the physical and emotional visual tasks and the drawing task given at the end of the session. The frequencies of correct answers in the drawing task are presented in Table 3-5. The first analysis, a 2 X 2 X 2 (Domain X Age X Type of Question) CATMOD procedure comparing performance on the visual emotion task and the physical drawing task, found no significant effects. The same analysis comparing performance on the visual physical task to the physical drawing task also indicated no significant effects.

TABLE 3-5

Percentage of Correct Responses on the Drawing Task as a Function of Age and Type of Question

	Type of Question	
Age	Representational Change	Other False Belief
3-Year-Olds	31	31
4-Year-Olds	48	50

Note. For each age group n = 32.

The above analyses included only the children in the visual condition. Another way to make this comparison would be to perform a between-subjects analysis using the

performance of the children in the visual physical and visual emotion conditions and the performance of children in the verbal condition on the drawing task. The drawing task always came last. Children in the visual condition had two visual presentations of stimuli before they performed the drawing task. In the verbal condition the children also had two tasks that came before the drawing but these were verbal in nature. Thus, there may be less carry-over effect due to experience in the verbal condition than the visual condition. A series of Chi-Squares comparing performance in the visual emotion and visual physical tasks to performance of the children in the verbal condition on the drawing task indicated that there were no differences in performance on the drawing task compared to either the visual physical task or visual emotion task. Performance on the drawing task in both the verbal and visual conditions tended to be in between performance on the visual physical and visual emotional tasks.

CHAPTER 4
DISCUSSION

There were two major purposes of the present study. The first was to compare the understanding of false beliefs in the physical and affective domains. Two types of false belief understanding were assessed: knowledge of representational change (your own belief has changed) and knowledge that another person can have a belief that differs from reality. The second purpose was to study the facilitation of this understanding by varying the way the reality information was presented.

Domain Comparisons

The 3-year-old children performed better in the affective domain than in the physical domain. This finding was consistent across types of questions (representational change and other false belief) and methods of presentation (verbal and visual). As has been found in previous studies, the 3-year-olds in this study performed below chance on the physical false belief task. Performance on this task was at the low end of results reported in other studies. The current study did not use a pretest to screen subjects and, therefore, may have contained more children with lower ability levels. However, these same 3-year-olds who had so

much difficulty on the physical task performed significantly better in the affective domain (at chance level on both types of false belief question).

The 4-year-olds' performance did not differ on the physical and affective tasks. There was, however, a trend toward better performance in the affective domain. Correct responding was at chance level on all questions except the affective representational change question which was above chance.

There could be several types of reasons for the performance differences in the affective and physical domains. First, even though the measures used in this study were carefully matched on a variety of dimensions, some explanations focus on differences in the specific tasks that may have affected performance. As the results section indicated, several of these explanations can be ruled out based on further analyses of the findings. Others could be explored by equating the tasks in the two domains on other types of dimensions. The second and more interesting type of explanation for better performance on the affective task is based on intrinsic underlying differences between the affective and physical domains. These differences exist regardless of task similarity and, therefore, can not be equated experimentally. Finally, it is important to note that this distinction between task-related and domain-related explanations is not absolute. Some differences

typically exist in the real world between the domains but can be equated using experimental tasks. However, caution should be used when equating tasks on such dimensions due to concerns about ecological validity. Several possible explanations for the findings of performance differences will now be discussed.

Task-Related Reasons for Differences

As discussed above, several possible explanations are related to the specific tasks. First, the salience of the false belief may have been increased in the affective task due to a greater contrast between reality and the misleading information. The two emotions (happy and sad) were at opposite ends of both affective valence (positive versus negative) and desirability (desirable versus undesirable) continua. The items used in the physical task, a crayon box and tape, did not possess as much valence and desirability discrepancy as happy and sad. Moses (1992) concluded that a contrast in desirability (positive vs. negative, or positive vs. positive) did not affect performance. Perhaps it is not desirability but the size of the discrepancy between what is expected and reality that is important. When Moses used items that contrasted greatly (trash in a candy box) the correct responding of old 3-year-olds on a physical false belief task was 54%--a good deal higher than the performance in this study. Other factors, however, may have influenced performance in the Moses study. For example, he included a

surprised reaction by the experimenter to the box contents and he also excluded 30% of his original sample through the use of a pretest. Thus, it is unknown whether a greater contrast between reality and the false belief facilitates performance.

A second possibility is that the use of the picture may have facilitated performance in the affective visual task. Perhaps a picture is a less reliable or certain way of knowing information than is actually seeing it as was the case in the physical task. The possibility that the drawing facilitated performance was rendered unlikely by the comparable performance in the verbal condition in which presentation of the information was exactly equated. In another way of looking at this issue, comparisons were made with the drawing control task. The results were inconclusive. Performance on the drawing task was in between performance on the other two tasks and did not differ from either. This task, however, always came last and may have been subject to experience effects.

A third reason for the differences in domains may be related to the number of presentations of the reality information. Children needed more presentations of information in the affective domain in order to correctly answer the memory question. This possible explanation can be ruled out based on further analyses of the children's performance. The children who received two presentations

did not differ in performance from those who received only one (in either domain). Furthermore, the findings are consistent even if the children who received two presentations are dropped from the sample. The fact that more presentations were needed suggests that the affective task may have been a bit more difficult for some of the children to understand. A picture a doll drew of how she feels inside may be a more complex concept than a box with something unexpected inside. However, once the children understood the concept and changed their belief about the doll's feeling their performance was no different regardless of the number of presentations they received.

Patterns of responding on appearance-reality tasks also suggest a possible explanation for differing performance on the two false belief measures. Furthermore, this explanation is related to both task and domain differences. In A/R tasks children typically make judgments about either object attributes or object identities (Flavell, Flavell, & Green, 1983, 1989; Taylor & Flavell, 1984). In a typical attribute task the child is shown a color cutout figure which is then placed behind a filter changing its apparent color. The children are asked what color the cutout really is and what color it appears to be. In an identity task children are shown an object that is not what it appears to be, such as a sponge that looks like a rock, and the A/R questions are then asked. The children typically make

different types of errors on the two tasks (Flavell et al., 1983; Taylor & Flavell, 1984) On attribute tasks a "phenomenism" error is most common with children reporting appearance when asked reality questions. Children tend to make an "intellectual realism" error on identity types of tasks, reporting reality to appearance questions.

Emotions require an attribute rather than an identity type of judgment. Consistent with this reasoning, Friend and Davis (1992) found that young children tended to make predominantly phenomenism errors on affective A/R tasks. If young children focus more on appearance in tasks involving attributes this should help their performance on an affective false belief task compared to performance on a physical task which is more similar to an identity A/R judgment. (The correct answer in a false belief task is to report the appearance.) The reasons given for children's differing responses in A/R tasks are also consistent with the current study's false belief findings. Flavell et al. (1983) suggest that children have more experience with an attribute actually changing (and, therefore, focus on appearance) than with the identity of an object changing. Children no doubt have a great deal of knowledge about changing emotions.

Although it is true that physical tasks can be designed to involve attribute judgments, it is also true that emotions will always be attributes while judgments in the

physical domain often involve object identities. This explanation of performance, therefore, is not only task related but is also concerned with basic differences in the domains.

Domain-Related Reasons for Differences

The more theoretically interesting explanations for the better performance of 3-year-olds and (to some extent) 4-year-olds on the affective task involve differences related to the domains themselves. As previously discussed, young children sometimes show improved performance on false belief tasks that do not involve verifiable facts, such as value beliefs (especially if the task is engaging and the false belief is made salient). In the present study the emotion condition was designed to emphasize the internal private nature of affective feelings. An emotion being experienced by another, especially one that differs from the emotion being displayed, may be less objectively verifiable than a box's content or an object's location. In real life this difference is readily apparent. It is much easier to verify the contents of a box than the emotions of another. This difference in verifiability exists regardless of the method of presentation of the reality information (as long as the emotion is presented as an internal and privately felt event) and, therefore, is consistent with the findings of similar patterns of responding in the visual and verbal conditions.

Children's performance in the affective domain in the current study was not very different from performance reported by Gross (1988). In her study a mask portrayed the apparent emotion and the real emotion was displayed on the face. As discussed before, these are both external representations of emotions. However, it is difficult to make comparisons between the two studies since Gross used false belief procedures that differed from standard measures. The performance of children in the physical task was higher than found in the current study. If the children in her study were responding to both tasks as if they were physical and performance elevation was due to methodology, this could explain her findings of no domain differences. Further analysis and comparisons based on Gross's study await a complete presentation of her research.

The domain differences may also be related to children's experience and interest in the affective domain. By age 3 children have experience in hiding their emotions (Cole, 1986). Perhaps they have begun to notice the misleading effect this has on others. Since they have also begun to mislead others about the physical world very early (Dunn, 1988) the acceleration effect may also involve children's intrinsic interest in the affective domain. As previously discussed, observational studies find that very young children demonstrate several types of advanced affective reasoning. For example, discussions of the causes

and effects of emotions appear by the second year, well before the discussion of other types of mental state terms (Bretherton & Beeghly, 1982). Furthermore, 2-year-olds refer more often to affective causal relationships than to physical causality (Bloom & Capatides, 1987). Before age 2 children are also pretending to have emotions that they are not currently experiencing (Dunn et al., 1987). Informal observations in the present study showed that the children seemed to respond to the affective and physical tasks differently. When looking at the picture of the sad face the children sometimes mimicked the expression themselves. They occasionally asked why the doll felt sad. They never asked why there was tape in the box.

One other difference in the two domains involves intentionality and desire. In order to hide an emotion a person must act intentionally and must desire to express something different from what he or she feels. The box with unexpected contents does not exhibit these same mental attributes. Research suggests that children understand the relationship between desire and behavior at a very early age (Wellman, 1990) before they understand the relationship between beliefs and behavior. Perhaps children are able to consider that the doll desires to hide her emotion and this helps them to understand that another will be misled (because the doll desires it). The improved performance found in some deception studies may also be related to the

desire to trick another person which is implicit (and in some cases made explicit) in deception tasks.

Methods of Presentation Comparisons

Inconsistent with predictions and previous research, verbal presentation of the reality information did not facilitate the performance of the 3-year-old children in either domain. The performance of the 4-year-olds was improved only for the representational change question and not for the other false belief question. The predictions were based on Zaitchik's (1991) research on the unexpected location task where improvement was found for both young and old 3-year-olds in a question about another's belief. She suggested that verbal presentation made the reality information less certain. Others suggest that the salience rather than the certainty of the reality information was reduced (Fritz, 1992). There is little evidence in the present study that verbal presentation of the information was considered to be less certain or salient than visual presentation, especially for the 3-year-olds.

Zaitchik (1991) has suggested that verbal information would not always be considered less reliable. Perhaps the structure of the current task (unexpected-contents) differed from hers (unexpected-location) in some way that affected the certainty or salience of the verbal information. For example, in the current task the children were asked the reality memory question before they were asked the false

belief questions, whereas in Zaitchik's study they were asked the memory question after they answered the false belief items. Answering the memory question first may have increased the certainty or salience of the reality information. The children may have assumed the experimenter would correct them if they were wrong. Another possibility is that there was something specific about Zaitchik's task such as having the container perceptually available but unopened that led to uncertainty about the object's location in her study.

In contrast to the 3-year-olds, the older children did indicate some facilitation from verbal presentation on the representational change question. Perhaps the older children viewed verbal presentation as less certain than did the younger ones. Older children have more experience with deception and are better deceivers (Russell et al., 1991; Sodian, 1991). If the verbal information was less certain for the older children than the visual information but not less certain for the 3-year-olds this could explain facilitation only for the 4-year-olds.

Facilitation of performance only on the representational change question for the 4-year-olds was unexpected. Most recent studies have found no differences in understanding on the two types of questions. However, further examination of the two studies that have attempted to facilitate performance, have used an unexpected contents

procedure, and have asked both representational change and other false belief questions, shows results that are not inconsistent with this finding. Fritz's (1992) preliminary study using an empty box found that 87% of the 3-year-olds answered the representational change question correctly while only 64% answered the other false belief question correctly (she did not include a standard task for comparison). On a modified other question a confederate was in the room while the task was performed. The child was then asked what the confederate thought was in the box before it was opened. In this condition the children performed equally well on the two types of questions.

In Sullivan and Winner's (1991) study there was no significant difference in the performance on the different questions in the facilitating conditions (which involved highlighting and explaining the source of the false belief, and playing a trick on another). However, the trend was in the same direction as in the present study in the most supportive conditions with 92% of the older 3-year-olds answering the representational change question correctly and 76% answering the other false belief question correctly. The frequency of correct responding on the standard task was 47% for both questions. The results of these studies suggest that in facilitating conditions performance may be higher on the representational change question.

To summarize, overall there was very little facilitating effect of verbal presentation of information. The process that was operating in Zaitchik's study (whether reduction in certainty or saliency) did not seem to be solely a result of the verbal nature of the presentation. In the one condition where a facilitating effect was found in the present study it was in the predicted direction with better performance for verbal presentation.

Representational Change and Other False Belief

As discussed previously the findings on performance differences on these two types of false belief have been mixed. Studies using questioning similar to the present study tend to show a difference favoring representational change (older studies) or no difference in the two questions (more recent studies). The findings for the 3-year-olds and the visual condition for the 4-year-olds are consistent with recent studies--no difference was found between the two questions. Performance in the verbal condition favored the representational change question for the 4-year-olds. As discussed above this is not inconsistent with findings of other similar studies.

The analysis of the individual patterns of performance also supports the hypothesis that both types of questions are equally difficult. More children answered both questions correctly in a single domain than answered both of

the representational change questions correctly or both of the false belief questions correctly.

Theoretical Implications

Some researchers have argued that although young children use display rules they do not understand the misleading impact of their emotional displays on another (Cole, 1986; Harris, 1989). The current study provides evidence that many 3-year-old children do understand that others can be misled by a facial expression. Although their knowledge is not perfect it is better than similar knowledge in the physical domain. Accelerated understanding is not surprising given the degree of interest and aptitude children demonstrate in the affective domain at an early age. Other types of knowledge involved in display rule understanding probably develop later, such as knowledge of why someone would want to deceive another or knowledge of the specific situations that elicit deception. However, it appears that one of the critical cognitive components, the understanding of false beliefs, is in place at an early age.

The current study's findings in the physical domain match those of others suggesting that 3-year-olds have great difficulty understanding object (fact) false beliefs. On a very similar type of task, however, in the affective domain these same 3-year-old children performed much better (at chance level). Although there are studies that show improved performance on false beliefs when the task is made

more supportive, most studies using the standard tasks (like the ones used in the present study) report that 3-year-old performance is below chance.

One study (Flavell et al., 1990) that reported improved performance for 3-year-olds seems especially relevant to the findings of the current study (although the findings must be interpreted with caution since the results were not replicated in a similar study). The young children seemed to understand that beliefs could differ from their own if the beliefs involved values rather than facts. As discussed previously, values and hidden emotions may have commonalities. Both are internal experiences that do not have readily observable verifiable realities. If, as many have claimed, the problem 3-year-olds have is in understanding that a representation can differ from reality, then a representation that requires less of this type of understanding should be easier. There may be a range of performance on false belief tasks depending on the relationship of the belief to reality.

The current study also suggests that it is not simply the verbal presentation of information that improves the performance of 3-year-olds. There seems to be an interaction of method of presentation, design of the task, and cognitive factors in the child that influence the certainty or salience of the reality information. The finding of improved performance for 4-year-olds argues for

the certainty hypothesis rather than the salience hypothesis. It is easier to imagine that verbal information may be less certain for older children than that it would be less salient.

The performance of the children in this study is also relevant to the claim by Lewis and Osborne (1990) that young children's problem with the task involves their understanding of the question. The young children in this study performed poorly in the physical condition even though the exact wording of Lewis and Osborne was used. The results are, therefore, inconsistent with Lewis and Osborne's findings of good performance in the unexpected contents task using the word "before" in the questions.

Future Research

The results of this study suggest several possible avenues for future research. First, differences in the affective and physical tasks should be addressed. Even though the consistency of performance across both the visual and verbal conditions argues against it, the possibility still exists that performance on the affective visual task was facilitated through the use of a picture to represent the emotion. Research directly comparing children's performance on a physical drawing task like the one in this study and a visual emotion task would help clarify this situation. An attempt should also be made to equate affective and physical tasks on the contrast between the

real and false belief information. As previously discussed, sad and happy are very different emotions (are basically opposites). Performance on these emotions could be compared to performance on physical tasks that contain a stronger contrast, such as a candy box with spinach inside.

In addition, to examine whether making judgments about attributes or entities affects performance physical false belief tasks could be designed that require children to make attribute judgments. For example, children could first look through a prism at a stick (making it look bent) and then the prism could be removed so that the children could see that it is really straight. The false belief questions could then be asked. Performance on these types of attribute tasks could be compared to performance in the affective domain (another type of attribute task).

Secondly, research should explore differences between the domains as possible contributors to improved affective performance. Measures of children's certainty about the reality of hidden emotions and hidden objects could be obtained. Less certainty about the reality of emotions would suggest that the reliability of the reality information may be playing a role. Emotions other than happy and sad should also be investigated. These two emotions are the first learned and recognized by young children (Gross & Ballif, 1991) and the results of the above

study (showing acceleration in the affective domain) may exist only for these particular emotions.

Understanding the misleading impact of emotional displays involves knowledge that a mental state (emotion) can be falsely represented by a behavior (facial display). This same type of understanding could be investigated for other types of mental states such as values, desires, knowledge, and so forth. For example, a child may dislike carrots but may eat them when they are served at a friend's house. Will the friend think the child likes or dislikes carrots?

Lastly, it is also important to study children's understanding of affective false beliefs in context. In the present task no information is given to the child beyond the real and false belief information. This is not the typically the way that children demonstrate their understanding in real life. Studies of physical or fact false belief that have been imbedded in certain types of context have shown improved performance. Perhaps children who are told a story about the child who is hiding his or her feelings will perform even better. A story would provide a rationale for the facial display. In addition, children's understanding of the misleading impact of facial displays in the world is based on more than the ability to understand false beliefs. Children must also be able to make inferences about situations and motives for hiding

affect. The study of affective false belief understanding in context awaits further investigation. The current study is one of the first steps in the exploration of children's understanding of the misleading impact of facial displays. There are still many questions remaining.

REFERENCES

Astington, J. W., & Gopnik, A. (1988). Knowing you've changed your mind: Children's understanding of representational change. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), Developing theories of mind (pp. 193-206). New York: Cambridge University Press.

Bartsch, K., & Wellman, H. (1989). Young children's attribution of action to beliefs and desires. Child Development, 60, 946-964.

Bloom, L., & Capatides, J. B. (1987). Sources of meaning in the acquisition of complex syntax: The sample case of causality. Journal of Experimental Child Psychology, 43, 112-128.

Bretherton , I., & Beeghly, M. (1982). Talking about internal states: The acquisition of an explicit theory of mind. Developmental Psychology, 18, 906-921.

Bretherton, I., Fritz, J., Zahn-Waxler, C., & Ridgeway, D. (1986). Learning to talk about emotions: A functionalist perspective. Child Development, 55, 529-548.

Brown, J. R., & Dunn, J. (1991). 'You can cry, mum': The social and developmental implications of talk about internal states. British Journal of Developmental Psychology, 9, 237-256.

Chandler, M., Fritz, A. S., Hala, S. (1989). Small-scale deceit: Deception as a marker of two-, three-, and four-year-olds' early theories of mind. Child Development, 60, 1263-1277.

Cole, P. M. (1986). Children's spontaneous control of facial expression. Child Development, 57, 1309-1321.

Davis, T. (1992). Sex differences in masking negative emotions: Ability or motivation? Manuscript in progress.

Dunn, J. (1988). The beginnings of social understanding. Cambridge, MA: Harvard University Press.

Dunn, J., Bretherton, I., & Munn, P. (1987). Conversations about feeling states between mothers and their young children. Developmental Psychology, 23, 132-139.

Ekman, P., & Friesen, W. (1975). Unmasking the face. Englwood Cliffs, NJ: Prentice-Hall.

Flavell, J. H., Flavell, E. R., & Green, F. L. (1983). Development of the appearance-reality distinction. Cognitive Psychology, 15, 95-120.

Flavell, J. H., Flavell, E. R., & Green, F. L. (1989). A transitional period in the development of the appearance-reality distinction. International Journal of Behavioral Development, 12, 509-526.

Flavell, J. H., Flavell, E. R., Green, F. L., & Moses, L. J. (1990). Young children's understanding of fact beliefs versus value beliefs. Child Development, 61, 915-928.

Flavell, J. H., Mumme, D. L., Green, F. L., & Flavell, E. R. (in press). Young children's understanding of moral and other beliefs. Child Development.

Freeman, N. H., Lewis, C., & Doherty, M. J. (1991). Preschooler's grasp of a desire for knowledge in false-belief prediction: Practical intelligence and verbal report. British Journal of Developmental Psychology, 9, 139-157.

Friend, M., & Davis, T. L. (1992). The appearance-reality distinction: Children's understanding of the physical and affective domains. Manuscript under review.

Fritz, A. (1990). Salience Bias as a constraint on a developing theory of mind. Unpublished manuscript.

Gnepp, J. (1983). Children's social sensitivity: Inferring emotions from conflicting cues. Developmental Psychology, 19, 805-814.

Gnepp, J., & Hess, D. L. (1986). Children's understanding of verbal and facial display rules. Developmental Psychology, 22, 103-108.

Gopnik, A., & Astington, J. (1988). Children's understanding of representational change and its relation to the understanding of false belief and the appearance-reality distinction. Child Development, 59, 26-37.

Gopnik, A., & Slaughter, V. (1991). Young children's understanding of changes in their mental states. Child Development, 62, 98-110.

Gross, A. L., Ballif, B. (1991). Children's understanding of emotion from facial expressions and situations: A review. Developmental Review, 11, 368-398.

Gross, D. (1989). Young children's understanding of misleading emotional displays. Paper presented at the Society for Research in Child Development, Kansas City, MO.

Gross, D., & Harris, P. (1988). False beliefs about emotion: Children's understanding of misleading emotional displays. International Journal of Behavioral Development, 11, 475-488.

Hala, S., Chandler, M., & Fritz, S. A. (1991). Fledgling theories of mind: Deception as a marker of three-year-olds' understanding of false belief. Child Development, 62, 83-97.

Harris, P. L. (1989). Children and emotion: The development of psychological understanding. Oxford: Basil Blackwell.

Harris, P. L., Donnelly, K., Guz, G. R., and Pitt-Watson, R. (1986). Children's understanding of the distinction between real and apparent emotion. Child Development, 57, 895-909.

Hogrefe, G., Wimmer H., & Perner, J. (1986). Ignorance versus false belief: A developmental lag in attribution of epistemic states. Child Development, 57, 567-582.

Leslie, A. M. (1987). Pretense and representation: The origins of "theory of mind." Psychological Review, 94, 412-426.

Leslie, A. M. (1988). Some implications of pretense for mechanisms underlying the child's theory of mind. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), Developing theories of mind (pp. 19-46). New York: Cambridge University Press.

Lewis, C. , & Osborne, A. (1990). Three-year-old's problems with false belief: Conceptual deficit or linguistic artifact? Child Development, 61, 1514-1519.

Lewis, M., Stanger, C., & Sullivan, M. (1989). Deception in 3-year-olds. Developmental Psychology, 25, 439-443.

Lillard, A. S., & Flavell, J. H. (1991). Young children's understanding of different mental states. Manuscript under review.

Moses, L. J. (1992). Young children's understanding of belief constraints on intentions. Manuscript under review.

Moses, L. J., & Flavell, J. H. (1990). Inferring false beliefs from actions and reactions. Child Development, 61, 929-945.

Perner, J. (1991). Understanding the representational mind. Cambridge, MA: MIT Press.

Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for conceptual deficit. British Journal of Developmental Psychology, 5, 125-137.

Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? The Behavioral and Brain Sciences, 1, 515-526.

Russell, J., Mauthner, N., Sharpe, S., & Tidswell, T. (1991). The 'windows task' as a measure of strategic deception in preschoolers and autistic subjects. British Journal of Developmental Psychology, 9, 331-349.

Saarni, C. (1979). Children's understanding of display rules for expressive behavior. Developmental Psychology, 15, 424-429.

Saarni, C. (1984). An observational study of children's attempts to monitor their expressive behavior. Child Development, 55, 1504-1513.

Siegal, M., & Beattie, K. (1991). Where to look first for children's knowledge of false beliefs. Cognition, 38, 1-12.

Siegel, S. (1956). Nonparametric statistics for the behavioral sciences. New York: McGraw-Hill.

Sodian, B. (1991). The development of deception in young children. British Journal of Developmental Psychology, 9, 173-188

Sodian, B., Taylor, C., Harris, P., & Perner, J. (1991). Early deception and the child's theory of mind: False trails and genuine markers. Child Development, 62, 468-483.

Sullivan, K., & Winner, E. (1991). When 3-year-olds understand ignorance, false belief and representational change. British Journal of Developmental Psychology, 9, 159-171.

Taylor, M., & Flavell, J. H. (1984). Seeing and believing: Children's understanding of the distinction between appearance and reality. Child Development, 55, 1710-1720.

Wellman, H. M. (1985). The child's theory of mind: The development of conceptions of cognition. In S. R. Yussen (Ed.), The growth of reflection in children (pp. 169-206). San Diego, CA: Academic Press.

Wellman, H. M. (1990). The child's theory of mind. Cambridge, MA: Bradford/MIT Press.

Wellman, H. M. (1991). From desires to beliefs: Acquisition of a theory of mind. In A. Whiten (Ed.), Natural theories of mind: Evolution, development and simulation of everyday mindreading (pp. 19-38). Oxford: Basil Blackwell.

Wellman, H. M., & Bartsch, K. (1988). Young children's reasoning about beliefs. Cognition, 30, 239-277.

Wimmer, H., & Hartl, M. (1991). Against the cartesian view on mind: Young children's difficulty with own false beliefs. British Journal of Developmental Psychology, 9, 125-138.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong belies in young children's understanding of deception. Cognition, 13, 103-128.

Zaitchik, D. (1991). Is only seeing really believing?: Sources of the true belief in the false belief task. Cognitive Development, 6, 91-103.

APPENDIX
SCRIPTS FOR VISUAL, VERBAL, AND PHYSICAL DRAWING CONDITIONS

Physical Domain

Look here's a box. What do you think is inside the box?

Visual: Let's look inside the box. Let's open it up and look inside. Now I'm going to put this back and close the box up again.
Verbal: Now I'm going to tell you what is inside the box. There is tape inside the box.
Drawing: Now I'm going to show you a picture of what's inside the box (show picture and then put picture away).

Can you remember what's inside the box?

Visual: What did you think was inside the box before I took the top off?
Verbal: What did you think was inside the box before I told you?
Drawing: What did you think was inside the box before I showed you the picture?

Now we are going to show this box to Bert.

Visual: Bert has never looked inside this box. We are going to show him this box for the very first time with the top on. Tell me what will Bert think is inside this box before I take the top off?
Verbal: Bert has never been told what what's inside this box. We are going to show him this box for the very first time. Tell me what will Bert think is inside this box before I tell him?
Drawing: Bert has never looked at the picture of what's inside the box. We are going to show him the box for the very first time. Tell me, What will Bert think is in the box before I show him the picture?

Affective Domain

Look here's a doll named Patty. What do you think Patty is feeling inside?

Visual: Patty drew a picture of what she is feeling inside. Let's look inside the folder to see what she is feeling. Let's look inside. Here is a picture of how Patty is feeling inside. Now I'm going to put this back and close the folder.
Verbal: Now I'm going to tell you how Patty is feeling inside. She feels sad inside.

Can you remember how Patty feels inside?

Visual: How did you think Patty felt inside before I showed you the picture?
Verbal: How did you think Patty felt inside before I told you how she feels?

Now we are going to show this doll Patty to Bert.

Visual: Bert has never looked inside the folder at the picture. We are going to show Patty to Bert for the very first time. Tell me, what will Bert think Patty feels before we show him the picture?
Verbal: Bert has never been told how Patty feels inside. We are going to show Patty to Bert for the very first time. Tell me, What will Bert think Patty feels before we tell him how she feels inside?

BIOGRAPHICAL SKETCH

Teresa L. Davis was born February 18, 1959, in Newport News, Virginia. She graduated from high school in Orange Park, Florida, and then attended the University of Richmond. In 1981, she received a Bachelor of Science degree in business administration.

After working for several years in the insurance industry she attended graduate school at the University of Florida and received a Master of Science degree in social psychology. Her interests became increasingly developmental resulting in a doctoral dissertation in developmental psychology focusing on children's social cognitive development. She plans to continue her study of social cognitive development after graduation.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Patricia H. Miller, Chairman
Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Scott A. Miller
Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

M. Jeffrey Farrar
Assistant Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Monica Biernat
Assistant Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

James Algina
Professor of Foundations of Education

This dissertation was submitted to the Graduate Faculty of the Department of Psychology in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree Doctor of Philosophy.

August 1992

Dean, Graduate School